

(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;  
and

(c) subjecting said semiconductor substrate to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film,

wherein a residence time of the etching gas within an etching chamber is set at 50 to 700 ms, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

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8. (Amended) A method according to Claim 1, wherein the temperature of said semiconductor substrate being plasma etched ranges from 100 to 130°C.

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13. (Amended) A method according to Claim 11, wherein a flow rate of said argon gas ranges from 400 to 800 cm<sup>3</sup>/minute.

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18. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon nitride insulating film over a semiconductor substrate;  
(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;  
and

(c) subjecting said semiconductor substrate to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said

silicon oxide insulating film,

wherein a residence time of the etching gas within an etching chamber is set at 50 to 350 ms, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

19. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon nitride insulating film over a semiconductor substrate;

(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;

and

(c) subjecting said semiconductor substrate to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film,

wherein a residence time of said etching gas within an etching chamber is set at 100 to 200 ms, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

20. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon nitride insulating film over a semiconductor substrate;

(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;

and

(c) subjecting said silicon oxide insulating film to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film,

wherein a pressure within an etching chamber during the plasma etching treatment ranges 0.7 to 7 Pa, and a total flow rate of the etching gas passed into said etching chamber is 700 cm<sup>3</sup>/minute, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

21. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon nitride insulating film over a semiconductor substrate;

(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;

and

(c) subjecting said silicon oxide insulating film to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film,

wherein a pressure within said etching chamber during the plasma etching ranges from 1.3 to 4 Pa, and a total flow rate of said etching gas passed into the etching chamber is at 700 cm<sup>3</sup>/minute or over, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

22. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

(b) forming a hard mask over said silicon oxide insulating film; and

*As amended*  
(c) subjecting said semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed, wherein a residence time of the etching gas within an etching chamber is set at 50 to 700 ms.

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37. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

*AS*  
(b) forming a hard mask over said silicon oxide film; and

(c) subjecting the semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a residence time of the etching gas within an etching chamber is set at 50 to 350 ms.

38. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

(b) forming a hard mask over said silicon oxide film; and

*AS cont*  
(c) subjecting the semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a residence time of the etching gas within an etching chamber is set at 100 to 200 ms.

39. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

(b) forming a hard mask over said silicon oxide film; and

(c) subjecting the semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas,

oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a pressure within the etching chamber during the plasma etching ranges from 0.7 to 7 Pa and a total flow rate of the etching gas passed into the etching chamber is 700 cm<sup>3</sup>/minute or over.

40. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

(b) forming a hard mask over said silicon oxide film; and

(c) subjecting the semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a pressure within the etching chamber during the plasma etching ranges from 1.3 to 4 Pa and a total flow rate of the etching gas passed into the etching chamber is 700 cm<sup>3</sup>/minute or over.